

***Compliance Test Report for
the Main Baghouse Stack at
the Arecibo Facility***

**Prepared for:
The Battery Recycling Company Inc.
Arecibo, Puerto Rico**

**Prepared by:
URS Corporation
Oak Ridge, Tennessee**

URS

**Test Date:
June 2010**

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AT THE ARECIBO FACILITY**

Prepared For:

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**URS Corporation
1093 Commerce Park Drive, Suite 100
Oak Ridge, Tennessee 37830**

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FOR THE MAIN BAGHOUSE STACK
AT THE ARECIBO FACILITY**

For:
BATTERY RECYCLING COMPANY, INC.

CERTIFICATION SHEET

Having reviewed the test program described in this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

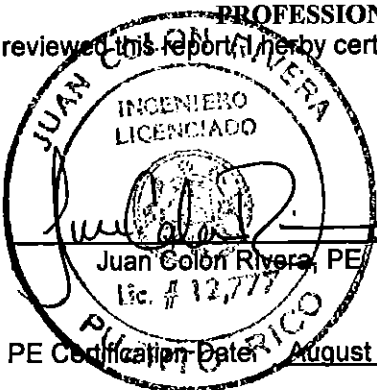
URS Corporation



Michael Mowery
Source Testing Manager

PROFESSIONAL ENGINEERING CERTIFICATION

Having reviewed this report, I hereby certify the contents of this report to be accurate and complete.



Juan Colon Rivera, PE
Lic. # 12,777

PE Certification Date: August 25, 2010

State of Certification: Puerto Rico

COLEGIO DE INGENIEROS Y AGRIMENSORES DE PUERTO RICO

Ing. Juan Colón Rivera
Lic # 12777 P.E.

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18/Aug/2008

Estado Libre Asociado de Puerto Rico
DEPARTAMENTO DE ESTADO
Secretaría Auxiliar de Juntas Examinadoras

*La Junta Examinadora de Ingenieros y Agrimensores
por la presente certifica que*

Juan Colón Rivera

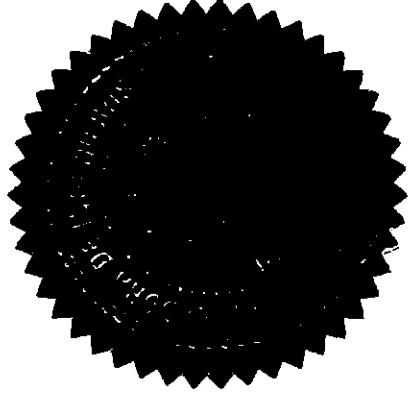
*por haber cumplido todos los requisitos de Ley, ha sido
inscrito en el Registro de esta Junta como*

Ingeniero Licenciado

*En testimonio del cual se expide esta licencia para el ejercicio
de dicha profesión bajo el sello de la Junta.*

En San Juan , Puerto Rico hoy día 12 de agosto de 2008.

*Licencia Número: 12777
Vencimiento: 20 de septiembre de 2012*



Juan L. Rivera

Presidente

[Firma]

Secretaría Auxiliar de Juntas Examinadoras

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List of Acronyms

BRC	Battery Recycling Company
CFR	Code of Federal Regulations
CO ₂	Carbon Dioxide
dscfm	Dry Standard Cubic Feet per Minute
EQB	Puerto Rico Environmental Quality Board
USEPA	U.S. Environmental Protection Agency
MACT	Maximum Achievable Control Technology
NSPS	National Emission Standards for Hazardous Air Pollutants
O ₂	Oxygen
QA	Quality Assurance
QC	Quality Control
SO ₂	Sulfur Dioxide
scf	standard cubic foot
scm	standard cubic meter
URS	URS Corporation

1.0 Introduction

The Battery Recycling Company, Inc. (BRC) owns and operates a lead recycling facility in Arecibo, Puerto Rico. BRC's operations are subject to the compliance requirements established in 40 CFR Part 63, Subpart X (National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting, "Secondary Lead Smelting MACT Standard"), the Subpart L, Standards of Performance for Secondary Lead Smelters and a construction permit issued by the Puerto Rico EQB. URS Corporation (URS) was contracted by BRC to conduct compliance particulate matter (PM) testing on their Main Baghouse stack, and face velocity measurements on the Lead and Slag Taps/Molds. The compliance testing was conducted the week of June 28, 2010.

The compliance testing allowed BRC to achieve six compliance objectives. The first three objectives were to determine if the Main Baghouse is in compliance with the 0.022 grains/dry standard cubic foot (gr/dscf) PM requirement, the 0.00087 grains/dry standard cubic foot Inorganic Lead requirement and the <20% opacity requirement, as set forth in the NSPS Standard Requirement 40 CFR 60.122(a). The forth objective was to verify that the face velocity of the emission controls on the furnace, slag transfer enclosures along with the kettles of a minimum of >300 feet per minute (fpm), as required in the MACT Standard 40 CFR 63.544. The fifth objective was to measure the SO₂ emissions from the Main Baghouse to confirm that the facility emissions are below the major source threshold of 100 tons per year of SO₂. The sixth objective was to collect actual emissions information to be used to develop an updated SO₂ emission factor for the facility. This test report presents the results of these test objectives along with the test data and description of the procedures used to collect the data.

Section 2.0 describes the methods and techniques that were used to conduct the compliance testing. Section 3.0 is a discussion of the compliance test results for the stack. Section 4.0 discusses the quality assurance (QA) and quality control (QC) procedures that were followed in the performance of the testing. Appendix A contains the compliance test calculation data for the stack. Appendix B contains the field data sheets. Appendix C contains the process data. Appendix D contains field equipment calibration data used in the compliance test.

2.0 Test Conditions and Technical Approach

The following sections describe the methods and techniques that were used to complete the compliance testing on the Main Baghouse stack.

2.1 Test Conditions and Schedule

During the week of June 28, 2010 URS performed; (i) three 1-hour test runs for particulate matter and inorganic lead, (ii) three 1-hour tests to determine Opacity, (iii) three batch test runs to determine sulfur dioxide emissions on the main baghouse stack, and, (iv) face velocity measurements at the opening to the rotary furnace enclosure, slag enclosure, transfer enclosure and to each kettle. Volumetric flow rate, molecular weight, and moisture were also determined on the main baghouse stack. The results of the tests will be used to confirm compliance with the plant's operating permit emission limits. The SO₂ emission data will be used to develop an emission factor for this type of facility.

The SO₂ sampling batches and run times had to be adjusted to acquire a representative test run demonstrating the normal operation of the furnace, all batch test calculations considered in the results encompass the start, middle and tapping of three representative batch runs. Some of the data was pulled from different charges to represent a full cycle.

2.2 Sample Locations

The stack sampling location was a baghouse exhaust stack 62.25 inches in diameter. Samples and velocity measurements were collected by accessing two test ports. The ports were located approximately 38 ft (7.32 diameters) downstream and 11 ft (2.12 diameters) upstream of the nearest duct transition or flow disturbance. Flow measurements were performed using a 12-point traverse using two ports (6 points per port). Appendix B contains the reference method field data sheets for the stack sampling location.

2.3 *Technical Approach*

The methodologies that were utilized for data collection are presented and summarized in Table 2-1. The sampling procedures included in the technical approach were selected to accurately determine the properties and composition of the stack's gas stream. The selected methodologies were consistent with those recommended and referenced in Title 40 of the Code of Federal Regulations Part 60 (40 CFR Part 60), Appendix A, and 40 CFR Part 63, Subpart X.

Table 2-1
Reference Method Test Procedures

Source	Pollutant	Reference Procedures for Performance Test
Main Baghouse Stack	Particulate Matter	EPA Title 40 CFR Part 60, Appendix A, Method 5, Determination of Particulate Matter Emissions from Stationary Sources
	Inorganic Lead	EPA Title 40 CFR Part 60, Appendix A, Method 12, Determination of Inorganic Lead Emissions from Stationary Sources
	Opacity	EPA Title 40 CFR Part 60, Appendix A, Method 9, Determination of Opacity Emissions from Stationary Sources
	Sulfur Dioxide	EPA Title 40 CFR Part 60, Appendix A, Methods 1 and 2, Determination of Stack Gas Volumetric Flow Rate
		EPA Title 40 CFR Part 60, Appendix A, Method 3A, Gas Analysis for Determination of Dry Molecular Weight
		EPA Title 40 CFR Part 60, Appendix A, Method 4, Determination of Moisture Content in Stack Gases
		EPA Title 40 CFR Part 60, Appendix A, Method 6C, Determination of Sulfur Dioxide Emissions from Stationary Sources

The following are summary descriptions of the sampling methodologies that were followed to complete the sampling program.

2.3.1 *EPA Methods 1 and 2, Determination of Stack Gas Volumetric Flow Rate*

U.S. Environmental Protection Agency (EPA) Methods 1 and 2 were used to determine the stack gas volumetric flow rate at the sampling location. An integrated velocity traverse was conducted during each 1-hour PM test run for the Main Baghouse stack at each traverse point. An S-type pitot tube and an incline manometer were used to measure the velocity pressure. A calibrated type "K" thermocouple was used to measure the stack gas temperature at each traverse point. For each test run, the Pitot tube and thermocouple were positioned sequentially at each of the appropriate traverse points. Temperature and ΔP readings were observed and recorded. Utilizing the stack gas molecular weight and moisture content, the standard (Q_{std}) and actual volumetric

flow rates were calculated in accordance with the formulas found in EPA Reference Method 2. The flow rate data has been included in Appendices A and B.

2.3.2 *EPA Method 3A, Determination of Stack Gas Molecular Weight*

The stack gas O₂ and CO₂ concentrations were continuously measured during each test run with a Servomex Model 4900 O₂/CO₂ analyzer in accordance with EPA Method 3A procedures. Data was collected in one minute average intervals and then averaged for each test. The resulting O₂ and CO₂ concentrations were used to calculate the molecular weight of the stack gas.

2.3.3 *EPA Method 4, Determination of Stack Gas Moisture Content*

The moisture content (%), B_{wo}, of the stack gas was determined for the Main Baghouse stack exhaust gases in accordance with EPA Method 4. An exhaust gas sample was drawn from the stack and passed through chilled glass impingers. The moisture content of the stack gas was determined for the compliance runs by measuring the weight gain of the chilled impingers over the length of the test run. The moisture determination was integrated into the Method 6C sampling results.

2.3.4 *EPA Method 5, Determination of Stack Gas Particulate Matter Emissions*

The solid particulate matter testing was performed in accordance to EPA Method 5. Sampling was performed by extracting a sample of the stack exhaust gas stream through a stainless steel button-hook nozzle attached to a glass-lined, heat-traced, probe. The probe was attached to a heated glass filter holder containing a pre-weighed glass-fiber filter. The probe and filter heater box were maintained at a temperature of 248°F ± 25°F. After leaving the filter holder, the gas stream sample passed through a series of four glass impingers. The first impinger was a Smith-Greenburg filled with 100 ml of 0.1 N Nitric Acid. The second impinger was a modified Smith-Greenburg and filled with 100 ml of 0.1 N Nitric acid. The third impinger was a modified Smith-Greenburg and was initially empty. The fourth impinger was a modified Smith-Greenburg containing approximately 200 grams of indicating silica gel. The impingers were weighed prior to assembling the sampling train to permit gravimetric moisture determination. After exiting the impingers, the exhaust gas sample traveled through an umbilical cord to the control console and

was then exhausted to atmosphere. The control console contained the sample pump, dry gas meter, calibrated orifice meter, and heat controls for the probe and filter box.

At the conclusion of each test run, the sample train was recovered by washing the sample probe and nozzle three times with 0.1 N nitric acid into a sample container. The filter was removed from the filter holder and placed into a Petri dish and sealed for transport. The front half of the glass filter holder and connecting elbow were washed with 0.1 N nitric acid into the probe wash sample container. A sample of the 0.1 N nitric acid used in the sample recovery was collected and analyzed as a reagent blank. The impinger train was then disassembled and each impinger was weighed to determine the moisture gained during the sample run. After weighing the impingers, the first three impingers were emptied into a container. Each impinger and connecting glassware was rinsed with 0.1 N nitric acid and collected, this was added to the sample container for the specific sample container for each run, each separate container for each test run was then labeled. At the conclusion of sampling, all the samples were packaged and returned to the URS facility for subsequent analysis and shipment to the laboratory.

The particulate samples were analyzed by URS personnel. The analysis was performed by placing the filters into a desiccator for a minimum of 24 hours. The filters were then weighed to a constant weight. The 0.1 N nitric acid probe rinses were transferred to pre-weighed cups and allowed to dry in a laboratory hood at ambient temperature. The sample cups were then transferred to a desiccator and allowed to dry for a minimum of 24 hours. The cups were then weighed to a constant weight. The combined weights of the filter and probe wash were used to calculate the mass emission rate of solid particulates. After obtaining the final particulate weights, the cups were reconstituted with 0.1 N nitric acid and sent to the lab along with the filters and impinger solutions for determination of the inorganic lead concentrations. The data collected during the PM sampling is contained in Appendix B.

2.3.5 *EPA Method 12, Determination of Stack Gas Inorganic Lead Emissions*

The inorganic lead emission rate was determined in accordance with EPA Reference Method 12 for the Main Baghouse stack. A total of three test runs were performed. The Method 12 sampling was incorporated into the Method 5 sampling train by replacing the water in the impingers with 0.1 N nitric acid. An exhaust gas sample was isokinetically drawn from the stack through a stainless steel nozzle attached to a heated glass lined sampling probe. The exhaust gas sample was then passed through a heated glass-fiber filter and into a set of chilled glass impingers. The impingers were connected to the control console by means of an umbilical cord. The control console contained the sampling pump, sample rate controller, test temperature controls and sample rate dry gas meter. The data collected during the lead sampling is contained in Appendix B.

2.3.6 *EPA Method 6C, Determination of Stack Gas Sulfur Dioxide Emissions*

The SO₂ sampling was performed by placing a stainless steel probe, complete with stainless steel sintered filter, into the stack and withdrawing a constant sample of exhaust gas from the stack. The sample probe was connected to a heated Teflon line that transported the sample from the end of the sample probe to the non-contact gas conditioning chiller system which removed the moisture from the gas stream. The dried gas sample then passed through an unheated Teflon transport line to the SO₂ continuous emission monitor (CEM). The CEM analyzer was located in a temperature-controlled room to minimize thermal affects on the calibration of the instruments. The CEM was connected to a computerized data acquisition system that recorded the SO₂ concentrations on a one-minute basis.

The SO₂ concentrations were measured using a Servomex Model 4900 SO₂ gas analyzer. The SO₂ sampling conformed to procedures presented in EPA 40 CFR 60, Appendix A, Method 6C and Appendix B Specification 2. The concentration and mass emissions of SO₂ in the gas stream are reported in parts per million by volume (ppmv) on a dry basis, pounds per hour (lb/hr) and tons per year (tons/year) respectively. The emission rates were calculated using the specific run

time average concentration in ppm, the dry standard volumetric flow rate, the Ideal Gas Law, and the sampling time.

2.3.7 *EPA Method 9 Determination of Stack Gas Opacity Emissions*

The VE observer that performed the VE readings used the following procedures for visually determining the opacity of emissions.

Observer's Position

The VE observer stood at a distance sufficient to provide a clear view of the emissions with the sun oriented in the 140° sector to his back. Consistent with maintaining the above requirement, the observer made his observations from a position such that his line of vision was approximately perpendicular to the plume direction and, when observing opacity of emissions from rectangular outlets (e.g., roof monitors, open baghouses, noncircular stacks), approximately perpendicular to the longer axis of the outlet. The observer's line of sight did not include more than one plume at a time when multiple stacks were involved, and in any case the observer made his observations with his line of sight perpendicular to the longer axis of such a set of multiple stacks (e.g., stub stacks on baghouses).

Field Records

The observer recorded the name of the plant, emission location, facility type, observer's name and affiliation, and the date on a field data sheet. The time, estimated distance to the emission location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), and plume background were recorded on the field data sheet at the time opacity readings were initiated and completed.

Observations

Opacity observations were made at the point of greatest opacity in that portion of the plume where condensed water vapor was not present. The observer did not look continuously at the plume but instead observed the plume momentarily at 15-second intervals.

Recording Observations

Opacity observations were recorded to the nearest 5 percent at 15-second intervals on the observational record sheet. A minimum of 240 observations were recorded. Each test period took

60 minutes to complete. Each momentary observation recorded was deemed to be representative of the average opacity of emissions for a 15-second period.

Data Reduction

Opacity shall was determined as an average of 240 consecutive observations recorded at 15-second intervals. For each set of 240 observations, the average was calculated by summing the opacity of the 240 observations and dividing this sum by 240. The average opacity was recorded on the observational record sheet.

2.3.8 *Determination of Hood Face Velocities using a Propeller Anemometer*

The face velocities at the opening to the rotary furnace, slag, and transfer enclosures and at the opening to each kettle operating during the testing period were measured using a propeller anemometer. The face velocities were measured with the doors open in a manner comparable to normal operating conditions. The measurements were conducted at multiple points around the door openings. The face velocity values listed in the result table consist of the average number observed during each check of the respective source. The results are listed in Table 2-2.

Table 2-2
Hood Face Velocities Results

Source	Process Equipment	Face Velocity
Furnace # 2	Slag Enclosure	345 ft/minute
	Furnace Enclosure	420 ft/minute
	Transfer Enclosure	436 ft/minute
	Kettle # 1	426 ft/ minute
	Kettle # 2	476 ft/minute
	Kettle # 3	444 ft/minute

3.0 *Performance Testing Emission Results*

The following is a brief summary and discussion of the Main Baghouse stack compliance testing results.

The compliance test results for the Particulate Matter runs are summarized in Table 3-1, the compliance test results for the Sulfur Dioxide batch runs are summarized in Table 3-2. The tests of BRC's Main Baghouse stack shows that it complies with the performance standard of 0.022 grains/dscf particulate matter and 0.00087 grains/dscf inorganic lead as stated in the the Subpart L, Standards of Performance for Secondary Lead Smelters. The average particulate matter emission rate, for the compliance test was 0.0018 grains/dscf. The average inorganic lead emission rate, for the compliance test was 0.00002 grains/dscf .The results for the compliance tests for Visible Emissions averaged 0.014% showing compliance with the less than 20% standard in the NSPS for Lead Smelters. The results for the Sulfur Dioxide batch runs averaged 32.45 tons/year based on 2000 lbs/ton and 8,760 hours per year of operation and 37.82 tons/ year based on the current construction permit limit of 3.35 batches per day and 365 days per year of operation, showing compliance with the non major source limit of 100 tons/year.

**Table 3-1
Main Stack Results Summary**

Parameters	Run # 1	Run # 2	Run # 3	Average
Sample Date	6/29/2010	6/29/2010	6/29/2010	
Run Times	0841-0943	1005-1107	1125-1227	
Sample Time	60	60	60	
Vol. Sampled @ STP (ft3)	36.644	37.478	36.527	36.883
Moisture Content (% Vol.)	4.4	3.9	4.0	4.1
O2 (%)	20.0	19.9	20.2	20.0
CO2 (%)	0.8	0.7	0.5	0.7
Stack Gas Temperature (°F)	190.8	190.1	183.6	188.0
Gas Flow Rate (DSCFM)	38,971	40,699	39,881	39,851
Percent Isokinetic	97.9	95.9	95.4	96.4
Particulate Matter Conc. (Grains/DSCF)	0.0017	0.0023	0.0015	0.0018
Particulate Matter Mass Rate (pounds/hr)	0.577	0.790	0.520	0.629
Inorganic Lead Conc. (Grains/DSCF)	0.00001	0.00006	0.00001	0.00002
Inorganic Lead Mass Rate (pounds/hr)	0.00211	0.02068	0.00202	0.00827
Visible Emissions (Opacity %)	0.0	0.042	0.0	0.014

**Table 3-2
Sulfur Dioxide Results Summary**

Compliance Test Data				
Parameters	Run # 1	Run # 2	Run # 3	Average
Sulfur Dioxide Mass Rate (lbs/hour)	6.26	9.07	6.89	7.41
Sulfur Dioxide Mass Rate (lbs/batch)	45.60	79.08	60.88	61.85
Sulfur Dioxide Mass Rate (tons/year)	27.42	39.73	30.19	32.45
Sulfur Dioxide Mass Rate (tons/year/batch)	27.88	48.35	37.22	37.82

4.0 *Quality Assurance/Quality Control Procedure*

The objective of the URS's QA Program is to ensure the accuracy and precision, as well as reliability, of the data collected and generated for URS's clients and to meet the data quality objectives of regulatory or accrediting bodies. Management, administrative, statistical, investigative, preventative, and corrective techniques were employed to maximize the reliability of data.

During the compliance testing, a strict QA/QC program was adhered to. Before actual sampling on-site, all the sampling equipment was thoroughly checked to ensure that each component was clean and operable. Any damaged or faulty equipment was tagged and removed from service until it could be repaired. If any corrective actions were taken in response to these QC checks or in response to supervisor review of QC procedures, the corrective action taken was documented in a field QA/QC logbook.

Proper equipment calibration is essential in maintaining the desired data quality level. All calibrations of the equipment used in the stack sampling portion of the testing conformed to the guidelines outlined in the EPA quality assurance handbook, *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods* (EPA-600/4-77-027a). The following sections give a synopsis of the calibration procedures for the main components of the stack sampling systems.

4.1 *CEM Calibration Procedures and Correction Factor Calculations*

The reference method analyzers were calibrated with EPA-approved RATA Class calibration gases prior to the beginning of the test series, and after each compliance test run. The initial calibration error checks were performed at the beginning of the test run series in accordance with the specific reference method applicable to the analyzer. After the successful completion of the initial calibration error check, a system bias check was performed.

Zero, mid and high point calibration bias checks were performed prior to the beginning of the compliance test runs. The bias check is a comparison of instrument response to gas introduced

into the analyzer with gases routed throughout the entire sampling system. The maximum allowable bias is 5% of the span. After the bias check was performed, the analyzers were not adjusted during the compliance tests, unless an analyzer failed the drift check. No analyzers failed the drift check.

After each compliance test run, a drift check was performed on each analyzer by introducing the mid-range calibration gas and the zero nitrogen. The maximum allowable calibration drift is 3% of the span. Calibration drift was determined by comparing the before run and after run values. The test data values were corrected for bias and calibration drift. The following calculation, as cited in the reference method, was used to correct the measured concentrations for bias and instrument calibration drifts:

$$C_{gas} = (C_{anz} - C_o) \frac{C_{ma}}{(C_m - C_o)}$$

where:

C_{gas}	=	effluent gas concentration, dry basis, ppmv
C_{anz}	=	average gas concentration indicated by the gas analyzer, dry basis, ppmv
C_o	=	average of initial and final system calibration bias check responses for the zero gas, ppmv
C_m	=	average of initial and final system calibration bias check responses for the upscale calibration gas, ppmv
C_{ma}	=	actual concentration of the upscale calibration gas, ppmv.

Response time tests were performed in conjunction with the bias checks. The response time test was performed by measuring the time it took for each analyzer to reach 95% of the concentration of the high range calibration gas. The zero gas was then introduced into the sample system and the amount of time it took for the analyzer to reach a 95% reduction in scale reading was measured. The greater of these two readings was recorded as the response time for that analyzer.

4.2 Dry Gas Meters/Orifice Meters

The dry gas meter and critical orifice in each control box to be used during the testing were calibrated before the test in order to ensure accurate measurements of the sample gas volumes. The dry gas meter and critical orifice are normally housed as a set inside each control box and were calibrated as such. The control box was calibrated against a secondary calibration standard dry gas meter.

The dry gas meter/critical orifice sets were calibrated at predetermined nominal volume flow settings. For each of these flow rates, an accuracy ratio factor to the calibration standard (Y_i) was computed for the individual dry gas meters. A successful calibration for a particular dry gas meter would be achieved if each value of Y_i was within 2 percent of the average value of Y_i ($Y_i = Y \pm 0.02Y$).

In order to establish calibration for the critical orifice, a calibration coefficient ($\Delta H@_1$) was calculated for each flow rate. This coefficient is the orifice pressure differential (in inches H_2O) at a distinct orifice manometer setting that gives a flow of $0.75 \text{ ft}^3/\text{min}$ of air at standard conditions. The desired tolerance for this coefficient is ± 0.2 of the average value of the four values of $\Delta H@_1$ ($\Delta H@ \pm 0.2$). If any of the pre-test calibration coefficients for a particular meter violates the acceptance criteria, the meter in question would be adjusted and recalibrated.

4.3 Thermocouples and Thermocouple Readouts

All thermocouples used during the stack sampling tests were calibrated to ensure accurate temperature measurements. All of the sensors utilized were type "K" thermocouples, which have a working range of approximately -300°F to approximately 2500°F . These sensors were used in the measurement of stack gas temperature, probe sheath temperature, filter box temperature, and impinger temperature. The thermocouples were calibrated against an NITS traceable mercury-in-glass thermometer at predetermined temperatures. In order to obtain the calibration data from each sensor, a single, recently calibrated thermocouple readout was used.

The thermocouple readouts used during the testing were calibrated using a thermocouple simulator. This calibration apparatus generates a voltage signal that mimics the signal an ideal "K" type thermocouple would exhibit at a particular temperature. The signal can be changed via

a slide switch. The readouts were calibrated at ten different points from 200 °F through 2000 °F, at increments of 200 °F.

4.4 Barometer

The field barometer to be used during the test was a digital type barometer. This barometer was calibrated by comparing it to a standard mercury column barometer and adjusting it if any deviation existed between it and the standard. This exercise was performed both before and after the testing activities.

4.5 Analytical Balance

The field analytical balance was calibrated before the test with certified standard weights. The balance was adjusted for any deviation from the standard weights. In the field, periodic checks were made to insure data validity. This balance was used to measure the impinger weight changes due to moisture gain during the stack sampling (determination of stack moisture content).

4.6 Pitot Tubes

The S-type pitot tubes used on each isokinetic sampling train were calibrated in a wind tunnel against a standard pitot, which is considered a reference source. The basis for the calibration is described in 40 CFR, Part 60, Appendix A, Method 2.